many years (see figure 7.6). These rocks exhibit a pronounced layering structure like a finely layered baklava pastry. For the most part, the layers of iron oxide alternate with layers of chert (silicon dioxide). They thus present a layered or varved appearance indicating they were deposited in water (sedimentary rocks). These deposits are located in quantity throughout the world's iron producing regions and constitute the primary source of iron for our industrial age. Although BIFs are known to have existed more than 3.5 billion years ago, almost all commercial deposits date between 2 and 2.5 billion years ago, with the majority dating at slightly more than 2 billion years ago.

Preston Cloud and other geologists have found that these BIF formations are found in association with *stromatolites*, rock deposits formed by blue-green algae. This is our first clue that mineral formation is related to biologic life. It indicates that the oxygen produced in the waters by blue-green algae may have been utilized in the formation of the BIFs. However, to understand how the BIFs were formed we must learn something about mineral chemistry.

When iron in surface rocks of the land is exposed to air or water containing oxygen, it rusts. Iron combines with oxygen to form the compound ferric oxide, rust, which is highly stable and resistant to erosion. Anyone who has tried to remove rusty iron from metal surfaces can testify to its tenacity.

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FIGURE 7.6

Specimen of Precambrian banded iron formation from the Iron River district, Michigan. (Courtesy U.S. Geological Survey; photo by Harold L. James.).